## REMARKS

Claims 1-13, 16-28, 31, and 32 are now pending in the application. By this paper, Claims 1 and 16 have been amended. The basis for these amendments can be found throughout the specification, claims, and drawings originally filed. No new matter has been added. The preceding amendments and the following remarks are believed to be fully responsive to the outstanding Office Action and are believed to place the application in condition for allowance.

The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

### REJECTION UNDER 35 U.S.C. § 103

Claims 1 and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kubo (U.S. Pat. No. 6,257,688) in view of Ishizaki (U.S. Pat. No. 6,454,377).

Claims 4 and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kubo (U.S. Pat. No. 6,257,688) in view of Ishizaki (U.S. Pat. No. 6,454,377), as applied to Claims 1 and 16 above, and further in view of Tajika (U.S. Pat. No. 5,861,895).

Claims 6 and 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kubo (U.S. Pat. No. 6,257,688) in view of Ishizaki (U.S. Pat. No. 6,454,377), as applied to Claims 1 and 16 above, and further in view of Nozawa (U.S. Pat. No. 6,499,812).

Claim 7 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Kubo (U.S. Pat. No. 6,257,688) in view of Ishizaki (U.S. Pat. No. 6,454,377), as applied to Claims 1 above, and further in view of Mikami (U.S. Pat. No. 4,633,269).

Claims 9, 11-15, 24 and 26-30 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kubo (U.S. Pat. No. 6,257,688) in view of Ishizaki (U.S. Pat. No. 6,454,377), as applied to Claims 1 and 16 above, and further in view of Usui et al. (U.S. Pat. No. 6,981,761).

Claims 10 and 25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kubo (U.S. Pat. No. 6,257,688) in view of Ishizaki (U.S. Pat. No. 6,454,377), as applied to Claims 1 and 16 above, and further in view of Shinoura et al. (U.S. Pat. No. 6,714,173).

These rejections are respectfully traversed.

Independent Claim 1 recites a droplet discharging apparatus including a means for discharging a discharge liquid in the form of droplets through an aperture by mechanically deforming a piezoelectric element by a normal drive signal. Independent Claim 1 further recites a drive integrated circuit disposed adjacent to and in thermal contact with the piezoelectric element and a temperature sensor associated with the drive integrated circuit for sensing a temperature of the drive integrated circuit. The sensed temperature of the drive integrated circuit approximates a temperature of the piezoelectric element while the approximated temperature of the piezoelectric element approximates a temperature of the discharge liquid. The droplets are discharged from the aperture by a cooling drive signal based on the approximated temperature of the discharge liquid, which is different from the normal drive signal.

Independent Claim 16 recites a droplet discharge method including sensing a temperature of a drive integrated circuit disposed adjacent to and in thermal contact with a piezoelectric element. Independent Claim 16 further recites approximating a temperature of the piezoelectric element based on the sensed temperature of the drive integrated circuit and approximating a temperature of a discharge liquid disposed adjacent to the piezoelectric element based on the approximated temperature of the piezoelectric element. The discharge liquid is discharged in the form of droplets through an aperture by mechanically deforming the piezoelectric element and is cooled by cooling discharge based on the approximated temperature of the discharge liquid, which is different from normal discharge.

As noted above, the present invention discloses a temperature detector (33c) associated with the drive integrated circuit (33) for use in detecting a temperature of a discharge liquid (L). See the Specification at Paragraph [0068]. The temperature detector senses a temperature of the drive integrated circuit, which is disposed in close proximity to a series of piezoelectric elements (30). See the Specification at Paragraph [0068] and FIG. 3. Because the piezoelectric elements are in close thermal connection with the discharge liquid through a diaphragm (22), the temperature detector is able to deduct a temperature of the discharge liquid simply by sensing the temperature of the drive integrated circuit. In other words, because the piezoelectric elements are in close connection with the discharge liquid via the diaphragm, and because the drive integrated circuit is in close thermal connection with the piezoelectric elements, sensing a temperature of the drive integrated circuit provides the temperature detector with an indication of the temperature of the discharge liquid. See the Specification at [0068]

and FIG. 3. The approximated temperature of the discharge liquid can then be used to create a cooling drive signal for use in discharging the discharge liquid via the piezoelectric elements.

Ishizaki and Kubo, either in combination or alone, fail to teach a temperature sensor associated with a drive integrated circuit for use in approximating a temperature of a discharge liquid. Furthermore, the combination of Ishizaki and Kubo fails to teach or suggest discharging droplets from an aperture by a cooling drive signal based on an approximated temperature of the discharge liquid, which is determined through detection of a temperature of a drive integrated circuit.

Kubo teaches an ink jet recording apparatus including a shear mode type recording head employing a piezoelectric ceramic material and a nozzle that applies ink to a medium in response to a drive-pulse signal. See Kubo at Column 3, Lines 12-23 and Column 4, Lines 42-46. A CPU changes the drive-pulse signal according to changes in ambient temperature to insure recording quality even when ambient temperature is varried. See Kubo at Column 6, Lines 45-56. In this manner, Kubo fails to disclose controlling an ink jet recording apparatus using a drive-pulse signal based on a temperature of the discharge liquid.

Ishizaki discloses a driving circuit for an ink jet printing head that applies a driving wave form signal to at least one piezoelectric actuator to rapidly change a volume of a pressure-producing chamber filled with ink to eject ink droplets from the nozzle. See Ishizaki at Column 2, Lines 50-64. A temperature sensor may be provided to detect a temperature of the piezoelectric actuator such that the wave-form signal supplied to the piezoelectric elements is based on a temperature of the piezoelectric elements. See

Ishizaki at Column 4, Lines 4-12 and Column 16, Lines 32-44. Therefore, while Ishizaki discloses sensing a temperature of a piezoelectric element, Ishizaki fails to teach or suggest sensing a temperature of a drive integrated circuit disposed proximate to a piezoelectric element for use in approximating a temperature of a discharged liquid.

Because the combination of Kuba and Ishizaki fails to teach or suggest the elements of independent Claims 1 and 16, Applicants respectfully submit that independent Claims 1 and 16, as well as Claims 2-13, 17-28, 31, and 32, respectively dependent therefrom, are in condition for allowance. Accordingly, reconsideration and withdraw of the rejections is respectfully requested.

**CONCLUSION**

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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